

1 month to 1 day earlier, or even *later* than the average.—LINCOLN CONSTANCE.

A Botanical Survey of the Olympic Peninsula, Washington. By GEORGE NEVILLE JONES. University of Washington Publications in Biology, Volume V. Pp. 288, with 9 plates. Seattle, June 25, 1936. \$2.00.

In this excellent study, Mr. Jones has produced the most thorough and successful treatment which any portion of the Pacific Northwest has received in the last thirty years. The Olympic Peninsula comprises some four thousand square miles, and contains the Washington expression of the Coast Ranges, the Olympic Mountains, which rise from sea-level to a height of nearly eight thousand feet and are completely isolated, by water or lowlands, from the neighboring Cascades and Oregon Coast Ranges.

Ever since Menzies collected briefly along this coast in 1792, the Olympics have been a prized ground for many collectors, including Henderson, Piper, Flett, Heller, Elmer, Thompson and many others. Several lists of species have appeared from time to time, beginning with Henderson's¹, and all the known species were included by Piper in his floras, but no prior attempt has been made to consider the area in question as a distinct vegetational and floristic unit.

Not the least satisfactory portion of the present paper is the introductory synecological and distributional discussion, modeled after that of Piper's *Flora of Washington*, and comprising nearly one-fourth of the volume. Jones has made an original contribution in attempting a correlation of the "life-zone concept" of Merriam with Raunkiaer's "biological spectrum." It will be recalled that Raunkiaer grouped plants into "life-forms," depending upon the mode of resistance of species to the critical period of the life cycle, and gauged by the position of the perennating organs. He defined the following groups: phanerophytes, chamaephytes, hemicryptophytes, cryptophytes and therophytes. Jones finds that the temperature and moisture conditions characterizing a given biotic belt are clearly indicated, in the main, by the definite proportional representation of these five different life-forms. The Arctic-Alpine zone, for example, lacks phanerophytes and therophytes, and has 21 per cent chamaephytes, 9 per cent cryptophytes and 69 per cent hemicryptophytes, whereas the neighboring Hudsonian zone exhibits the following proportions: 9 per cent phanerophytes, 10 per cent chamaephytes, 67 per cent hemicryptophytes, 13 per cent cryptophytes and 1 per cent therophytes.

According to the author: "The significance of the Raunkiaer system of life-forms as applied to the flora of the Olympic Penin-

¹ Henderson, L. F. *Flora of the Olympics*. *Zoe* 2: 253-295. 1891.

sula is threefold. By means of this system a statistical analysis can be made of the flora of the whole region, or of the flora of each of the four life-zones taken separately. By whichever method used the results are comparable with the flora of other regions, and a simple but biologically sound summary of the phytoclimate thus can be obtained. As applied to Merriam's life-zones, the Raunkiaer system yields corroborative data. Merriam was concerned chiefly with the factors of the climate which are effective during the season of growth and reproduction, whereas the Raunkiaer system is based on the adjustment of plants to the unfavorable, which is usually the dormant, season. By the application of both of these systems, a much clearer characterization of the life-zones or climatic formations may be obtained."

The outstanding characteristics of the region are its isolation and the wealth of climatic and altitudinal diversity which it manifests. The peaks of the range afford a serious obstacle to water-laden clouds, so that the 150-inch rainfall on the coast dwindles to fifteen inches at irrigated Sequim, on the northeast. It is not surprising, then, that the area presents a peculiar and interesting flora. Although 75 per cent of the flora is that of the adjacent Cascades, many Cascadian plants have not yet been found here, and many species extend their ranges northward or southward to the Olympic Peninsula, without occurring west of Hood Canal. Of especial interest is the occurrence of a small group of endemics, probably relicts, which are almost exclusively confined to unglaciated areas of high altitude, and which make up about 2 per cent of the total flora.

Over one thousand species and varieties are recognized for the Olympic Peninsula, which is over one-third of the known flora of Washington. The author exhibits laudable restraint in proposing only four new species, three new varieties, one new form and twenty-one new combinations, many of the latter being worthwhile reductions.

By his comprehensive study of the vegetation and the distribution of its species, with a consideration of the factors involved, in addition to the annotated catalogue of vascular plants (provided with keys and citations of specimens), Jones has produced a highly important piece of work. The prevalent attitude of the past has been to consider the whole region only as a promising field for the discovery of novelties. Similar attacks upon other mountainous areas in the Northwest will afford opportunity for significant comparisons with the flora of the Olympics. Now that Jones' study has revealed the necessity for more detailed investigations of the Cascades before any very satisfactory comparisons can be made between the two ranges, it is to be hoped that he will find time to give us a comparable study of Mount Rainier—a project which he has long had in mind.—LINCOLN CONSTANCE.